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ABSTRACT

Previous research has demonstrated the effectiveness of using paraprofessional trainers in teaching students with tension headaches to relax, thus reducing the frequency of their headaches. A technique for automated self-instructed relaxation training was compared to a paraprofessionally trained group and a no-treatment control group over a 3-week period, using 15 college students as subjects. The results of a simple-main effects trend analysis showed that both paraprofessional and self-instructing groups were effective in reducing the frequency of their headaches with no similar changes in the control group. Follow-up evaluations were completed during final exam week, the second week of the following new semester, and after termination of the program. The frequency of headaches for both experimental groups remained at rates below that of frequencies during the pretreatment week. Self-instruction and paraprofessional training appear to be effective and efficient alternatives to practitioners in view of the trend toward physiological monitoring. (Author/NRB)

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A Comparison of Paraprofessionally Trained and Self-Instructed Relaxation Training for the Reduction in Frequency of Tension Headaches

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A Comparison of Paraprofessionally Trained and Self-Instructed Relaxation Training for the Reduction in Frequency of Tension Headahces

Psychological components in the form of anxiety, frustration, or stress seem to be necessary (but perhaps not sufficient) conditions for the onset or aggravation of tension headaches typically considered to involve muscular tension and vasoconstriction (Tasto & Hinkle, 1973). A constant factor in the production of tension headaches appears to be an inability to relax the muscles of the face, scalp and neck, although not everyone with these characteristics develops headaches. Fichtler and Zimmerman (1973) and Danials (1973) have demonstrated that relaxation training altered the consequence of these components by reducing the frequency, duration, and interference of tension headaches.

Tasto and Hinkle (1973) found that students who were trained in relaxation by paraprofessionals and who implemented relaxation training by self-monitoring could effectively treat tension headaches. Due to the success of the program without the use of anxiety hierarchies and without the presence of a therapist, they suggested that undergraduate students in counseling centers, nurses in medical settings, and other paraprofessionals could easily be trained to treat tension headaches in a very efficient way with minimal therapist-client contact.

However, researchers have not taken the direction suggested by Tasto and Hinkle. The trend among researchers has been instead toward greater physiological monitoring. For example, Sturgis,

Tollison, and Adams (1978) examined the effect of blood volume pulse and frontalis muscle action potential feedback on control of vasoconstriction of the temporal artery and frontalis muscle activity. Russ, Hammer, and Adderton (1979) treated tension headache patients with biofeedback techniques of frontalis electromyogram feedback and/or peripheral temperature feedback. Regardless of the success of these procedures, the more expensive the equipment and the more involved the training required to use it, the more unavailable the treatment becomes for use by paraprofessionals such as resident assistants. Thus, as the treatment of tension headaches moves in the direction of physiological monitoring fewer and fewer people are served by the treatment methods.

Therefore the purpose of this study was to examine more practical alternatives to treating tension headaches, alternatives that would be readily available to paraprofessionals. The study incorporated Tasto and Hinkle's paraprofessionally trained group with one additional treatment group and a no-treatment control group. The additional treatment group had no therapist contact and were not paraprofessionally trained. They received completely automated self-instructed relaxation training. The dependent variable was the reported frequency of tension headaches. This variable was selected because it was one of the three dimensions on which tension headaches are generally evaluated. The other dimensions are intensity and duration.

Method

Subjects

Twenty-four students responded to an official notice in the campus newspaper announcing the beginning of the research project. Students were selected for the study based on their responses to questions (see Table 1) posed over the phone by counselors at the campus Counseling Center. Questions in the diagnostic sheet were designed to differentiate persons with migrane headaches from those having tension headaches. Fifteen of the 22 students were found to have tension headaches. They ranged in age from 19 to 29 and reported onsets of tension headaches from 6 months to 22 years prior to the study.

Insert Table 1 About Here

Procedure

Diagnostic Sheet. The content validity of the diagnostic sheet was established by the Campus Committee for the Protection of Human Subjects. The Committee, which included a Student Health Center physician, gave their approval to the program, including approval of the diagnostic sheet as adequately protecting subjects by differentiating tension headaches from other forms of headaches.

Instructions to participants. At an initial meeting, students received headache logs which provided a means of keeping track of the frequency of headaches. They were told to keep the logs in their

possession and to record their headaches for the pretreatment week and asked to return at the same time one week later to begin the actual relaxation training program.

At the second meeting students were given their treatment group assignments. Intake cards collected at the first meeting had been randomly assigned by social security numbers to three blocks of students, each with five members. The two treatment groups (i.e., the self-instructing and the paraprofessionally trained group) and the no-treatment control group were then randomly assigned to the three blocks of students. All random assignments were done by the use of a table of random numbers.

The students comprising the control group were given enough headache logs for three weeks of recording. They were then dismissed and told that they would have an opportunity to participate in the experiment after the completion of the study. The remaining students each received a set of three relaxation training tapes and a daily practice record to record their practice each day. They were instructed to listen to tape 1 once a day for the first week, tape 2 for the second week, and tape 3 for the third week.

The following directions were given to the self-instructed and the paraprofessionally trained groups: It is absolutely necessary to practice your relaxation exercises once a day and record your practice daily. With practice you will learn to become more deeply relaxed and the length of time it takes to achieve a state of relaxation will decrease with daily practice.

It was further explained that whenever they felt the slightest indication of a headache coming on during their daily routine, they were, insofar as possible, to cease the activities engaged in and to work on relaxing in whatever ways attainable under the circumstances. The point was also made that early in relaxation training all headaches may not be controlled by this process until a state of relaxation can be achieved rather rapidly. At this point, the self-instructed treatment group was dismissed and asked to report back in three weeks.

The paraprofessionally trained treatment group then began individual instruction in the procedure of muscle relaxation from a trained paraprofessional. The paraprofessional instructed each student in four sessions at weekly intervals during the three week experimental period. Each of the four sessions involved working on relaxing and reiterating what to do at the onset of a headache. The paraprofessional trainer was a beginning masters degree student in Counseling and Guidance. As preparation, she listened to the relaxation training tapes and was instructed to be empathic, provide information, and make sure that the students in her group practiced the relaxation training exercises once a day.

Instructions at termination. At the end of the three week experimental period all logs were collected. Daily practice records were examined and all participants had practiced at least 19 out of the 21 possible practice sessions. The self-instructing and paraprofessionally trained groups of students were told that they could

expect to be contacted twice in the next several months and again in one year for a total of three follow-up studies to determine if they had maintained the current frequency of their headaches. They also were told to remember how they had learned to relax and that when they felt themselves becoming tense that they were to remove themselves in as much as possible from the situation and relax.

Results

Although equal numbers of students were originally assigned to blocks, several subjects dropped out before the scheduled termination of the experiment. For example, two members of the control group (A3) refused to participate because they were dissatisfied with being placed in the control group. Another student was excluded from the data analysis in the self-instructing group (A1) because she lived on the same floor in a residence hall with the paraprofessional trainer with whom she discussed the relaxation training program regularly. A second student in the self-instructing group (A1) opted for individual counseling after the first experimental week (B2). Because the resulting unequal block sizes may be assumed to have resulted from the nature of the experimental treatments, the analysis of variance was computed by the least-squares method (Kirk, 1968).

There were also two subjects from which no measure was obtained during the pretreatment week (B1). Their scores were estimated by an iterative process as outlined by Kirk (1968). The estimated

missing scores were accounted for by reducing the degrees of freedom in the appropriate error term (B x subject within groups) by two.

To make certain that the data for the relatively small sample size still met the assumptions for analysis of variance, tests for homogeneity of error term variances and for the equality of the variance-covariance matrix were calculated. To test the homogeneity of error term variances, two F_{max} tests were calculated. Since both $F_{max(obs)} < F_{max(.05)}$ it was concluded that the error term variances were homogeneous, and no transformation of the data were required. The variance-covariance matrix revealed nearly equal variances and covariances for the parameters in the linear model. Therefore, the assumption of approximately equal variances and covariances is reasonable for this data.

Based on previous research (Tasto & Hinkle, 1973) and the expected carry-over effect in the 3 x 4 repeated measures design, it was a priori hypothesized that the mean frequency of tension headaches would best be described by a decreasing linear function for the experimental groups (A1 and A2), and that the mean frequency would remain constant for the control group (A3). The plotted means for each level of group (A1, A2, & A3) in Figure 1 rather crudely fit a straight line, but the crudeness of the fit may be due to errors in the data. Thus, the null hypothesis was tested (for each experimental group A1, A2, & A3) that $H_{0(d_1):d_1=0}$ where d_1 is the slope of the best fitting straight line. The null hypothesis states

that the best fitting straight line has a slope of zero.

Insert Figure 1 About Here

If the relationship is in fact linear all the significant differences in the data should be accounted for by the test for a linear trend. The second null hypothesis then states that H_0: $SS_{\text{departure from linearity}} = 0$. To test both null hypotheses a simple main effects trend analysis was computed across weeks (B1 to B4) for each level of group (i.e., SS_B at a_i), where i = 1, 2, 3.

As can be seen from the analysis of variance summary table (Table 2) all three groups A1, A2, and A3 were most appropriately described by a straight line, i.e., we failed to reject the null hypothesis that $SS_{\text{departure from linearity}} = 0$. However, in the two experimental groups, A1 and A2, we rejected the null hypothesis (see Table 2) that the slope (d_i) of the best fitting straight line was equal to zero.

Insert Table 2 About Here

Figure 1 graphically shows that the two experimental groups, A1 and A2, experienced a linear reduction in the mean frequency of their tension headaches over the experimental period, whereas the control group maintained a constant number of headaches over the same period.

Follow-up data. The follow-up data were not statistically analyzed because of the rather atypical times the data were gathered,

because of the potential confounding effects, such as moving or changing jobs, and because there was no comparative control group (A3). The follow-up times were selected for the first follow-up time because it was assumed that during final exam week the influence of factors that aggravate the frequency of tension headaches for students would be highest. For comparative purposes the second follow-up data was collected during the second week of the new spring semester when the same aggravating factors may be assumed to be at their lowest. The third follow-up done one year later was to determine the long-range impact of the tension headache program on reducing the frequency of tension headaches. For all follow-ups students were asked to fill out the headache logs for one week.

As would be expected, the self-instructing group (A1) experienced an increase in the frequency of headaches during finals week, and a decrease during the first two weeks of the new semester. The increase again one year later indicates some instability warranting cautious generalizations. The mean frequency of headaches experienced by the paraprofessionally trained group (A2) remained relatively constant, decreasing somewhat during the third follow-up. Figure 1 indicates that although the frequency of tension headaches increased from the termination of the experiment (B4), the experimental subjects (A1 & A2) apparently learned to relax sufficiently enough to have fewer headaches at the time of the follow-ups than before their participation in the relaxation training program. At the time of the third follow-up all

participants expressed their satisfaction with the program and its current usefulness in decreasing the frequency of their tension headaches.

Discussion

In terms of efficiency, the self-instructed group was a vast improvement over the paraprofessionally trained group. The necessity for the student to be trained by a paraprofessional is eliminated (along with the time taken to train the paraprofessional) as well as the requirement for students to report weekly for training and instruction. Because self-instructed relaxation training was effective in reducing the frequency of tension headaches in this study, perhaps an alternative treatment that does not require professional or paraprofessional assistance could be suggested to students by counselors and resident assistants. For example, it would even be possible for a dormitory to set up a check-out system for copies of the relaxation training tapes to be listened to by residents on their own. Some sort of follow-up system could also be devised.

Although a subject was lost in the self-instructed group it was not felt that this supported the fears that self-instruction results in high attrition rates (Nawas, 1971; Phillips, Johnson, and Geyer, 1972). The student who dropped out of the self-instructed group and opted for individual counseling also dropped out of school shortly after individual counseling began. Perhaps studies that report high attrition rates in self-instructing groups should examine the

objective of their study and not the method used.

Because the results for the paraprofessionally trained group replicated the findings of Tasto and Hinkle it would appear that paraprofessionals have a positive impact on the treatment of tension headaches. This would suggest the possibility of introducing resident assistants to the use of systematic relaxation in their training programs.

Although the results of this study should be interpreted with caution, it appears that paraprofessional training and self-instruction may be two practical alternatives to treating tension headaches that should not be overlooked in the trend toward sophisticated physiological monitoring.

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Diagnostic Sheet

Name: _____

Address: _____

Phone: _____ Age: _____

Cassette Tape Recorder? yes no

How long have you been having these headaches? _____

How long does each headache last? _____

How many headaches do you have in a 1 week period? _____

Would you describe the pain you experience as being dull and persistent, a feeling of heaviness, pressure or tightness, cramping, aching, or soreness? yes no ??

Do you experience a throbbing pain or is it more of a constant pain? throbbing constant ??

Do you experience the pain on just one side of your head or is it all over? one side all over ??

Do nausea and vomiting often accompany the headache? yes no ??

Is the pain worse when you're lying down and lessened when sitting or standing? yes no difference ??

Does the pain last for a few hours with intensification near the day's end? yes no ??

Is the pain relieved by external support of the head, the application of hot packs or massage to the neck? yes no ??

Does the pain last for 1 to 3 days then go away? yes no ??

Do you experience any sensory changes due to your headache, such as increased sensitivity to odors, loud noises, or do you have spots before your eyes prior to or after the headache? yes no ??

Do other members of your family suffer from the same type of headache? yes no ??

Have you suffered a head injury, have any dental problems, or been straining your eyes? yes no ??

Criterion for inclusion:

1. Responses were those that were underlined.
2. No more than 50% of the responses were underlined question marks. If more than 50% of the responses were underlined question marks, refer student to Health Center for clarification.
3. Any response that is not underlined is indicative of migrane headaches and students should be referred to the Health Center.

Note: Many of these questions were taken from DeGowin and DeGowin, 1976.

Table 2

Analysis of Variance Summary Table for the
Trend Analysis in the 3 x 4 Repeated Measures Design

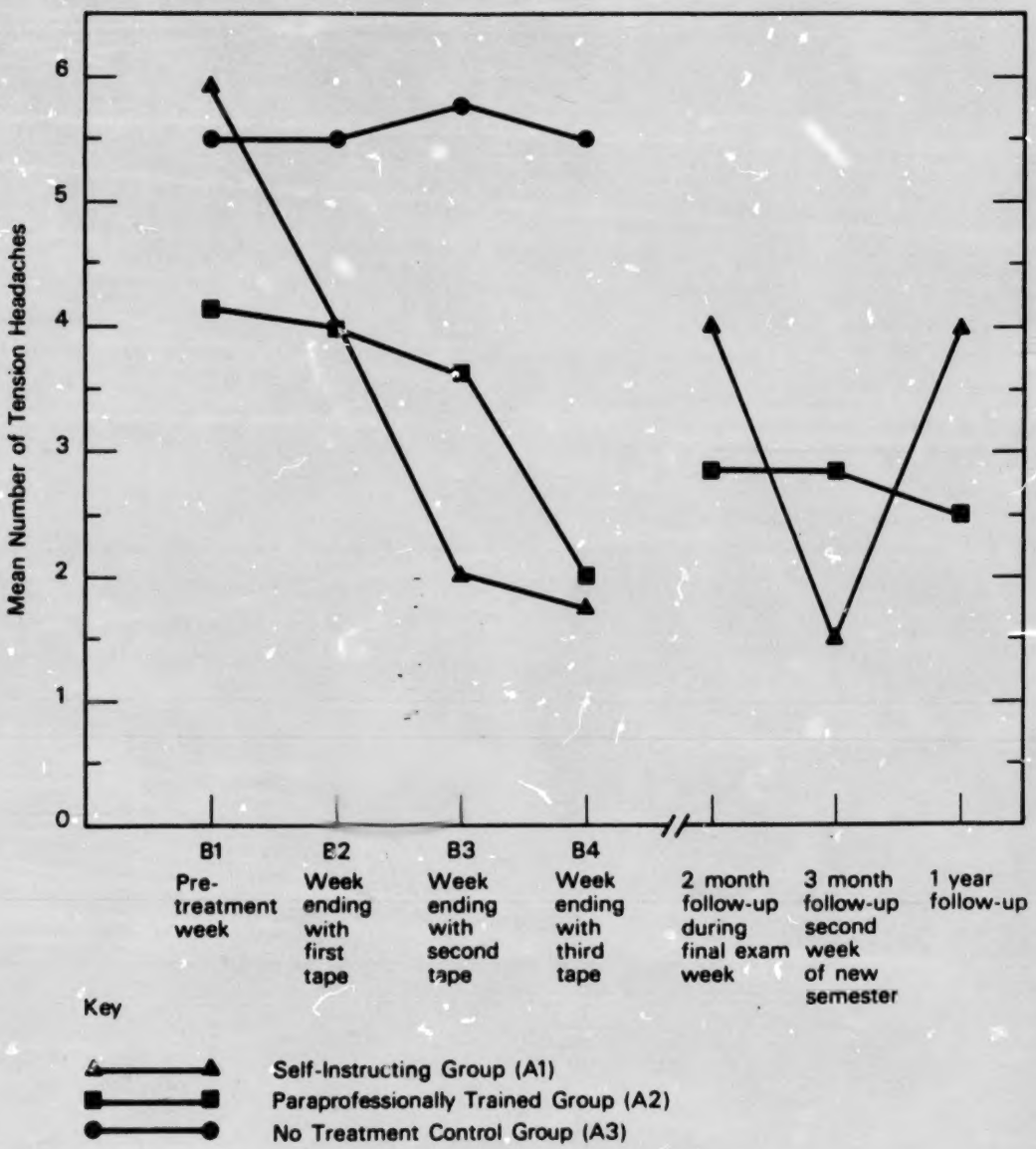
Source	SS	df	MS	F
A	46.802	p-1 = 2	23.401	1.396
Subjects W/GPS	134.087	N-p = 8	16.761	
Between B at a_1	36.249	(q-1)= 3		
Linear Trend	22.816	(q-3)= 1	22.816	10.773+
Departure from Linearity	13.433	(q-2)= 2	6.716	3.171
Between B at a_2	14.801	(q-1)= 3		
Linear Trend	16.356	(q-3)= 1	11.356	5.362*
Departure from Linearity	3.444	(q-2)= 2	1.722	< 1
Between B at a_3	.249	(q-1)= 3		
Linear Trend	0	(q-3)= 1	0	0
Departure from Linearity	.249	(q-2)= 2	.1249	< 1
B x Subjects W/GPS	46.602	(N-p)(q-1)-2 =22	2.118	
Total	278.793	Nq-1 = 43		

*p < .05

+ p < .01

Figure Caption

Figure 1. Plotted mean frequencies of tension headaches for experimental and control groups across weeks of experiment.


Mean Number of Tension Headaches
6
5
4
3
2
1
0
B1
Pre-treatment week
B2
Week ending with first tape
B3
Week ending with second tape
B4
Week ending with third tape
2 month follow-up during final exam week
3 month follow-up second week of new semester
1 year follow-up
Key
Self-Instructing Group (A1)
Paraprofessionally Trained Group (A2)
No Treatment Control Group (A3)